

cautions which were justified by reports were recommended. Observations taken on the U. S. Transport *Kilpatrick* on September 3, when in about latitude north 25°, longitude west 68° 35', show that hurricane winds were encountered in that position. It appears, therefore, that while the storm possessed but moderate intensity over the Caribbean Sea, Santo Domingo, and Haiti it acquired great strength after its re-curve northward and northeastward over the ocean.

THE WEST INDIAN HURRICANE OF SEPTEMBER 8-13, 1899.

The center of this hurricane did not reach any of the islands of the West Indies, and the winds of its west quadrants were severely felt only over the outlying Leeward Islands of the Lesser Antilles.

On September 7 the Central Office of the Weather Bureau at Washington advised its observers in the eastern West Indies that conditions were threatening over the Lesser Antilles, and to be alert to take local action if necessary. The morning of the 8th the approach of a severe storm from the eastward of St. Kitts was indicated, and hurricane signals were ordered on that island, and advisory messages were telegraphed to all other observers in the threatened district. It was calculated at that time that the hurricane would reach only the extreme northeast islands, and subsequent events show that this was a correct calculation. At St. Kitts the wind reached a velocity of 62 miles an hour at 8:18 p. m. of the 8th, and an extreme velocity for one minute of 120 miles an hour was recorded at 5:51 p. m. The islands to the east and northeast of St. Kitts experienced correspondingly severe winds, and reports from vessels show that the violence of the hurricane did not lessen during its subsequent northwest, north, and northeast course over the ocean. During the night of the 12-13th the hurricane center passed over or very near the Bermuda Islands, causing considerable damage in that group.

The following reports are descriptive of the hurricane and indicate the character of the action taken by the Weather Bureau in issuing warnings of its approach:

Basseterre, St. Kitts, W. I., W. H. Alexander, Observer, Weather Bureau:

The day preceding the hurricane was marked by considerable haze, a red sunset, low barometer, and a clear, smooth sea. The night preceding the hurricane a close watch was kept on the weather, and at 5 a. m., local time, a precautionary warning was issued quickly and thoroughly by telephone, and the information was telegraphed to the United States Consul at Antigua, which is about 60 miles east from St. Kitts. At 11:41 a. m. an order to hoist the hurricane signal was received from Washington. The storm began at 3:40 p. m., nearly ten hours after the first warning was issued, and three hours after the actual display of the signals. There was neither thunder nor lightning during the storm. The total rainfall was 3.13 inches, the heaviest fall occurring during the first two hours of the storm. The variations in temperature were very slight, and the clouds, though rapid in motion, did not present such a confusion and whirling as characterized the clouds during the storm of August 7, 1899. (The maximum wind velocities are given in a table on another page of this REVIEW). The lowest barometer, 29.506, was reached at 5 p. m. on the 8th.

This hurricane, as compared with that of August 7, was slightly less intense, and far less disastrous, owing, no doubt, to the fact that only the strong trees and buildings were left, and these were able to successfully resist the attacks of the weaker storm. Otherwise there would have been very much the same story to tell. A few small huts were destroyed, rendering about 200 people homeless; two schooners, with cargoes, total value \$25,000, wrecked; one small boat, valued at \$240, wrecked, and cane crop badly damaged. The neighboring islands to the east suffered about the same as St. Kitts, except the little island of Anguilla, where as many as 200 houses were demolished and 800 people were rendered homeless. The steamship *Caracas*, of the Red D Line, met the storm 400 miles north of Porto Rico, and experienced its fury from midnight on Saturday until Monday morning. In about the same region the schooner *Isaac Newton* was dismasted and waterlogged on Sunday, the 10th. The crew of this schooner, when rescued

on the 13th by the steamship *Fontabelle*, were standing in water waist deep, and had been without food and fresh water for three days. They report the occurrence, during the hurricane, of a severe hailstorm, lasting about half an hour, and producing intense cold. The hailstones were very large, and fell with great force. The steamship *Fontabelle* encountered the hurricane at midnight the 11th, in latitude 29° 20' N. and longitude 68° 20' W. From 2 to 8:30 a. m. of the 12th the wind blew at an estimated velocity of 90 miles per hour, first from east-southeast, then backing to east-northeast, after which, with diminished force, it backed to southwest. Heavy rain fell from 1:30 a. m. to 4:30 a. m. The lowest pressure noted was 28.40 inches. The Captain reports the loss of a large quantity of deck cargo and live stock, also that the storm was intensely severe, and that the escape of the vessel from damage was remarkable.

On the morning of the 9th the following message was sent to the central office of the Canadian Meteorological Service at Toronto, through which reports from Bermuda are transmitted to this Bureau:

Hurricane central northeast of Porto Rico, moving northwest, and is likely to pass near Bermuda.

Similar messages were at the same time sent to the New York and Philadelphia Maritime Exchanges and to the Press Associations. The hurricane reached Bermuda the night of the 12th; hence the message above quoted gave warning of the storm three days in advance of its arrival.

The following, which shows the violent nature of this hurricane during its passage over or near the Bermuda Islands, is furnished by the Associated Press:

Island of Bermuda, September 13.—A hurricane swept over this island last night. Many houses were blown down and others were unroofed. The storm raged during all of last night. No lives were lost, but heavy damage was done to public and private property, fruit and cedar trees. The causeway was wrecked and the government house was damaged.

The weather looked threatening early Tuesday morning, with a falling barometer. The storm began with heavy rain at 2 p. m., after which there was a slight lull for a few hours, with the wind south-southeast and the barometer steadily falling. The wind suddenly backed to east, blowing with cyclonic gusts. From 8 p. m. to midnight it blew with hurricane force and was at its worst from 1 a. m. to 1:45 this morning, when, after a lull, the wind changed to the southwest, when the principal damage was done. Giant cedars were uprooted, ornamental and fruit trees were destroyed, and wharfs were washed into the sea. All communication with St. Georges was cut off and news from the western end of the island and the dockyard is not procurable at present. The telephone and telegraph poles and wires are down, causing a total interruption of business.

There has been considerable damage at the military camp. The city hall, public gardens and hotels, and several public and private dwellings were also damaged, and numerous small craft in the harbors were sunk or driven ashore. The British steamer *Duart Castle*, Captain Seeley, from Halifax, September 8, for the Windward Islands and Demarara, was to have left port at 4 p. m. yesterday, but the storm delayed her sailing.

Cedar avenue was practically ruined, many of its trees being prostrated, and others are badly injured. The storm was the worst known here since the hurricane of 1880; in fact, many of the inhabitants say it exceeded that of 1880 in violence. The weather now is moderating and the barometer is rising. It is rumored that damage amounting to £100,000 has been done at the dockyard alone.

On Ireland and Boaz Islands everything is more or less injured. The damage is roughly estimated at £100,000. At Somerset all the boats and small craft were destroyed, trees demolished, and houses unslated and otherwise damaged. At Prospect Camp the damage is estimated at £3,000.

More than half a mile of the causeway connecting the mainland with St. Georges is totally destroyed. It will cost £13,000 to repair it. News from St. Georges, received by a whaleboat, says serious damage has been done there to trees, houses, etc. All the boats have been destroyed or badly injured.

Reports from outlying parishes are slowly coming in. They all show that there has been great destruction of trees and serious injury to houses and other property. From what can be learned here there has been no loss of life. It is a curious coincidence that the great gale of 1839 occurred on September 11 and 12 and this one was on September 12 and 13. No correct estimate of the amount of damage to private property can at present be obtained, but it will be fully £100,000.

From press reports received it appears that this hurricane advanced from Bermuda to the vicinity of the Newfoundland coast, where on the night of the 14th violent gales occurred which caused considerable damage to fishing craft and the loss of four lives.